Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) An optical recording medium, comprising at least one optical recording layer, the optical recording layer including an optical recording material that changes a state of photo-induced birefringence in response to a recording light that is externally controlled from the optical recording medium to rotate a polarization angle of the recording light, a portion of the recording layer that changes a state of photo-induced birefringence substantially acting optically as a half-wave plate; and

a substrate which sustains the optical recording layer,

wherein an azimuth of the half-wave plate within the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

2. (Previously Presented) The optical recording medium as claimed in Claim 1, wherein said optical recording layer substantially satisfies:

$$\Delta n \bullet d = (m+1/2) \bullet \lambda$$

where:

Δn is a refractive index change induced by recording light,

d is a thickness of the optical recording layer,:

λ is the wavelength of reproducing light and

m is an integer.

3. (Original) The optical recording medium as claimed in Claim 1, wherein the photo-induced birefringence is caused by a refractive index change Δn induced by recording light, and the refractive index change Δn is a saturated refractive index change value when a recording light irradiation amount is greater than a saturation light amount.

4. (Previously Presented) The optical recording medium as in Claim 1, wherein said polymer or a liquid crystal polymer comprises a side chain that includes a group which is photoisomerized.

5. (Original) The optical recording medium as claimed in Claim 4, wherein said polymer or said liquid crystal polymer contains an azobenzene skeleton.

6. (Original) The optical recording medium as claimed in Claim 4, wherein said polymer or liquid crystal polymer comprises at least one kind of monomer-polymer selected from a polyester group.

7. (Original) The optical recording medium as claimed in Claim 1, wherein said optical recording layer comprises a polymer in which photoisomerized molecules are dispersed.

8. (Original) The optical recording medium as claimed in Claim 7, wherein said polymer contains an azobenzene skeleton.

9. (Original) The optical recording medium as claimed in Claim 7, wherein said polymer comprises at least one kind of monomer selected from polyesters.

10. (Original) The optical recording medium as claimed in Claim 1, wherein said optical recording layer has a disk shape.

11. (Previously Presented) An optical recording medium comprising:

at least one optical recording layer including an optical recording material that changes a state of photo-induced birefringence in response to a recording light that is externally controlled from the optical recording medium to rotate a polarization angle of the recording light, a portion of the recording layer that changes a state of photo-induced birefringence substantially acting optically as a quarter-wave plate; and

an optical reflection layer formed on one surface of said optical recording layer,

wherein an azimuth of the quarter-wave plate within the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

12. (Previously Presented) The optical recording medium as claimed in Claim 11, wherein said optical recording layer substantially satisfies:

$$\Delta n \bullet d = (m+1/4) \bullet \lambda$$

where:

Δn is a refractive index change induced by recording light,

d is a thickness of the optical recording layer,

λ is a wavelength of reproducing light, and

m is an integer.

13. (Previously Presented) The optical recording medium as claimed in Claim 11, wherein the photo-induced birefringence is caused by a refractive index change Δn induced by recording light, and the refractive index change Δn is a saturated refractive index change value when a recording light irradiation amount is greater than a saturation light amount.

14. (Original) The optical recording medium as claimed in Claim 11, wherein said optical recording material comprises that a polymer or a liquid crystal polymer in which a side chain includes a group that is photoisomerized.

15. (Original) The optical recording medium as claimed in Claim 14, wherein said polymer or said liquid crystal polymer contains an azobenzene frame.

16. (Original) The optical recording medium as claimed in Claim 14, wherein said polymer or said liquid crystal polymer comprises at least one kind of monomer-polymer selected from a polyester group.

17. (Original) The optical recording medium as claimed in Claim 11, wherein said optical recording layer comprises a polymer in which photoisomerized molecules are dispersed.

18. (Original) The optical recording medium as claimed in Claim 17, wherein said polymer contains an azobenzene frame.

19. (Original) The optical recording medium as claimed in Claim 17, wherein said polymer comprises at least one kind of monomer-polymer selected from a polyester group.

20. (Original) The optical recording medium as claimed in Claim 11, wherein said optical recording layer has a disk shape.

21. (Cancelled)

22. (Previously Presented) An optical recording method comprising:

controlling a polarization angle of a recording light emitted from a light source, the recording light externally controlled from an optical recording medium to rotate the polarization angle of the recording light;

illuminating the optical recording medium with said recording light; and

forming an optical element on the optical recording medium by the illumination, that acts substantially as a half-wave plate, having an azimuth corresponding to a polarization angle on the optical recording medium,

wherein the azimuth corresponding to a polarization angle on the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

23. (Original) The optical recording method as claimed in Claim 22, wherein said step of controlling said polarization angle comprises directing said recording light emitted from said light source to a polarization rotary device.

24. (Original) The optical recording method as claimed in Claim 22, wherein said step of forming said optical element comprises rotating a disk-like optical recording medium and directing said recording light along a diameter direction of said optical recording medium.

25. (Original) The optical recording method as claimed in Claim 22, wherein said optical element is formed in a position at least partially coextensive with an existing optical element in said optical recording medium.

26. (Previously Presented) An optical recording method comprising:

controlling a polarization angle of a recording light emitted from a light source, the recording light externally controlled from an optical recording medium to rotate the polarization angle of the recording light;

illuminating the optical recording medium with said recording light; and

forming an optical element on the optical recording medium by the illumination, that acts substantially as a quarter-wave plate, having an azimuth corresponding to a polarization angle on the optical recording medium,

wherein the azimuth corresponding to a polarization angle on the optical recording medium is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

27. (Original) The optical recording method as claimed in Claim 26, wherein said step of controlling said polarization angle comprises directing said recording light emitted from said light source to a polarization rotary device.

28. (Original) The optical recording method as claimed in Claim 26, wherein said step of forming said optical element comprises rotating a disk-like optical recording medium and directing said recording light along a diameter direction of said optical recording medium.

29. (Original) The optical recording method as claimed in Claim 26, wherein said optical element is formed in a position at least partially coextensive with an existing optical element in said optical recording medium.

30. (Currently Amended) An optical recording apparatus comprising:

a light source that generates recording light;

a spatial optical modulator that controllably rotates a polarization angle of said recording light; and

a focusing optical system that performs multilevel modulation of an azimuth of a half-wave plate or a quarter-wave plate within an optical recording layer ~~within~~ of an optical recording medium by directing the recording light obtained through the spatial optical modulator to the optical recording medium.

31. (Original) The optical recording apparatus as claimed in Claim 30, wherein said spatial optical modulator controls a polarization angle of said recording light in response to recording information.

32. (Original) The optical recording apparatus as claimed in Claim 30, wherein said spatial optical modulator is a polarization rotary device.

33. (Original) The optical recording apparatus as claimed in Claim 30, further comprising:

a medium driving mechanism that rotates said optical recording medium; and

a head moving mechanism that moves an optical recording head including said light source, said spatial optical modulator, and said focusing optical system, in a diameter direction relative to said optical recording medium.

34. (Original) The optical recording apparatus as claimed in Claim 30, further comprising said optical recording medium.

35. (Previously Presented) An optical recording medium, comprising an optical recording layer including an optical recording material that stores multilevel information using a light induced birefringence that acts optically as a half-wave plate, an orientation of an azimuth of birefringence formed by a recording light representing the multilevel information, the recording light externally controlled from the optical recording medium to rotate a polarization angle of the recording light; and

a substrate which sustains the optical recording layer,

wherein the azimuth of birefringence formed by the recording light is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

36. (Original) The optical recording medium as claimed in Claim 35, wherein said optical recording layer has a disk shape.

37. (Previously Presented) An optical recording medium, comprising an optical recording layer including an optical recording material that stores multilevel information using a light induced birefringence that acts optically as a quarter-wave plate, an orientation of an azimuth of birefringence induced by controllably rotating a polarization angle of a recording light externally from the optical recording medium that represents the multilevel information; and

a substrate which sustains the optical recording layer,

wherein the orientation of the azimuth of birefringence is multilevel-modulated so that information is recorded on the optical recording medium by the recording light.

38. (Original) The optical recording medium as claimed in Claim 37, wherein said optical recording layer has a disk shape.

39. (Cancelled)

40. (Previously Presented) An optical reproducing method comprising:

radiating a reproducing light on an optical recording medium in which an azimuth of an optical element that acts substantially as a half-wave plate is multilevel recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

determining a polarization angle of the reproducing light transmitted by said optical element,

wherein the reproducing light is directed on the optical recording medium in which an azimuth of the half-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

41. (Original) The optical reproducing method as claimed in Claim 40, wherein said reproducing light has a light intensity smaller than that of said recording light.

42. (Original) The optical reproducing method as claimed in Claim 40, wherein said step of determining said polarization angle comprises of rotating said optical recording medium and said step of radiating comprises radiating said reproducing light along a diameter direction of said optical recording medium.

43. (Previously Presented) An optical reproducing method comprising:

radiating reproducing light on an optical recording medium in which an azimuth of an optical element that acts substantially as quarter-wave plate is multilevel-recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

determining a polarization angle reproducing light reflected from said optical element,

wherein the reproducing light is directed on the optical recording medium in which an azimuth of the quarter-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

44. (Original) The optical reproducing method as claimed in Claim 43, wherein said reproducing light has a light intensity smaller than that of said recording light.

45. (Original) The optical reproducing method as claimed in Claim 43, wherein said step of determining said polarization angle comprises rotating said disk-like optical recording medium and said step of radiating comprises radiating said reproducing light along a diameter direction of said optical recording medium.

46. (Previously Presented) An optical reproducing apparatus comprising:

a reproducing light optical system for transmitting reproducing light to an optical recording medium in which an azimuth of an optical element that acts substantially as a half-wave plate is multilevel recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

an analyzing unit that detects a polarization angle of reproducing light transmitted by said optical element,

wherein the reproducing light is directed on the optical recording medium in which an azimuth of the half-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

47. (Original) The optical reproducing apparatus as claimed in Claim 46, further comprising:

a medium driving mechanism that rotates said optical recording medium; and

a head moving mechanism that moves an optical reproducing head including said reproducing light optical system and said analyzing unit, along a diameter direction of said optical recording medium.

48. (Original) The optical reproducing apparatus as claimed in Claim 46, further comprising said optical recording medium.

49. (Previously Presented) An optical reproducing apparatus comprising:

a reproducing light optical system for emitting reproducing light toward an optical recording medium in which an azimuth of an optical element that acts substantially as a quarter-wave plate is multilevel recorded in response to a polarization angle of a recording light that is externally controlled from the optical recording medium to rotate the polarization angle of the recording light; and

an analyzing unit that detects a polarization angle of reproducing light reflected by an optical reflection layer and transmitted by said optical element,

wherein the reproducing light is directed on the optical recording medium in which an azimuth of the quarter-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

50. (Original) The optical reproducing apparatus as claimed in Claim 49, further comprising:

a medium driving mechanism that rotates said optical recording medium;

a head moving mechanism that moves an optical reproducing head including said reproducing light optical system and said analyzing unit, along a diameter direction of said optical recording medium.

51. (Original) The optical reproducing apparatus as claimed in Claim 49, further comprising said optical recording medium.

52. (Currently Amended) An optical recording and reproducing apparatus comprising:

a light source that generates a recording light;

a polarization rotary device that rotates a polarization angle of said recording light;

a focusing optical system that irradiates an optical recording medium with said recording light obtained from said polarization rotary device;

a reproducing light optical system that irradiates said optical recording medium with reproducing light; and

an analyzing unit that detects a polarization angle of reproducing light acted on by said optical recording medium,

wherein the reproducing light is directed onto the optical recording medium after an azimuth of a half-wave plate or a quarter-wave plate within the optical recording medium has been multilevel-modulated so that recorded information can be reproduced.

53. (Currently Amended) A method for optically recording and reproducing information, comprising:

controlling a polarization angle of a recording light emitted from a light source, the recording light controlled externally from an optical recording medium to rotate the polarization angle of the recording light;

illuminating the optical recording medium with said recording light;

forming an optical element on the optical recording medium by the illumination having an azimuth corresponding to a polarization angle on the optical recording medium;

radiating reproducing light on the optical recording medium; and

determining a polarization angle of reproducing light acted on by said optical element,

wherein the reproducing light is radiated onto the optical recording medium after the azimuth of a half-wave plate or a quarter-wave plate within the optical recording element has been multilevel-modulated so that recorded information can be reproduced.

54. (Currently Amended) A device for optically recording and reproducing information, comprising:

controlling means for controlling a polarization angle of a recording light emitted from a light source, the recording light controlled externally from an optical recording medium to rotate the polarization angle of the recording light;

forming means for forming an optical element on the optical recording medium by the illumination having an azimuth corresponding to a polarization angle on the optical recording medium;

illumination means for radiating reproducing light on the optical recording medium; and

determining means for determining a polarization angle of reproducing light acted on by said optical element,

wherein the reproducing light is directed onto the optical recording medium after the azimuth corresponding to the polarization angle on a half-wave plate or a quarter-wave plate within the optical element has been multilevel-modulated so that recorded information can be reproduced.

55. (Previously Presented) An optical recording medium, comprising an optical recording layer in which an optical element is formed by a recording light that is externally controlled from the optical recording medium to rotate a polarization angle of the recording light, the optical element having an azimuth of birefringence and acting on reproducing light

to adjust a polarization angle of the reproducing light by an amount greater than a difference between a polarization angle of the recording light used to form the optical element and a polarization angle of the reproducing light before the reproducing light is acted on by the optical element; and

a substrate which sustains the optical recording layer,

wherein the reproducing light is directed onto the optical recording medium after the azimuth of birefringence of the optical element has been multilevel-modulated so that recorded information can be reproduced.

56. (Previously Presented) The optical recording medium of claim 55, wherein the optical recording layer comprises at least one of a polymer and a liquid crystal polymer.

57. (Previously Presented) The optical recording medium of claim 1, wherein the optical recording material of the optical recording layer comprises at least one of a polymer and a liquid crystal polymer.

58. (Cancelled)

59. (Previously Presented) The optical recording medium of claim 35, wherein the optical recording material of the optical recording layer comprises at least one of a polymer and a liquid crystal polymer.

60. (Previously Presented) The optical recording medium of claim 37, wherein the optical recording material of the optical recording layer comprises at least one of a polymer and a liquid crystal polymer.

61. (Cancelled)